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RESEARCH REPORT

UNITED STATES COAST GUARD ANTISUBMARINE WARFARE (ASW) IN THE MARITIME DEFENSE ZONE (MDZ) - A STRATEGIC APPROACH -

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AIR UNIVERSITY
UNITED STATES AIR FORCE
MAXWELL AIR FORCE BASE, ALABAMA

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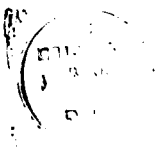

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EXECUTIVE SUMMARY

TITLE: United States Coast Guard Antisubmarine Warfare (ASW) in the Maritime Defense Zone (MDZ) - A Strategic Approach
AUTHOR: Andrew L. Gerfin, Jr., Commander, USCG

Within the guidelines of the National Security Policy, and specifically the concepts of the National Maritime Defense Strategy, this paper explores the present and potential future capability of the United States Coast Guard to perform antisubmarine warfare in the Maritime Defense Zone. A brief review of the Coast Guard's missions, military history and the establishment of the Maritime Defense Zones lays the foundation for defining the threats to United States coasts, ports and harbors and for delineating the means, or forces, available to defend them. Several options for upgrading the Coast Guard's force structure are presented, which accommodate the Nation's forward power projection policy, while recognizing a lack of antisubmarine warfare platforms available for the Maritime Defense Zones.

BIOGRAPHICAL SKETCH

Commander Andrew L. Gerfin, Jr., a 1989 graduate of the Air War College, has a Masters Degree in Human Resources Management from Pepperdine University. He is a 1969 graduate of the Coast Guard Academy with a Bachelor of Science Degree in Electronics. He served in Vietnam on board the Coast Guard Cutter *Hamilton* as an Engineering Watch Officer in 1969-1970. As an aviator, he has been assigned to Coast Guard Air Stations in Brooklyn, N.Y., New Orleans, La., Mobile, Al., Borinquen, P.R., and Sitka, Ak. He has maintained a keen interest in submarines and antisubmarine warfare throughout his whole career. Commander Gerfin is presently Commanding Officer, Coast Guard Air Station, Traverse City, Mi.

UNITED STATES COAST GUARD
ANTISUBMARINE WARFARE (ASW)
in the
MARITIME DEFENSE ZONE (MDZ)
- A STRATEGIC APPROACH -

CHAPTER I
PURPOSE

When the Navy-Coast Guard Board (NavGard Board) assigned the Coast Guard responsibility for both peacetime and wartime maritime defense functions within the Maritime Defense Zone (MDZ) in 1984, the United States Coast Guard's traditional peacetime role as "The Lifesavers" changed profoundly. This agreement established a Coast Guard peacetime functional relationship with the Navy, which normally existed only in wartime. One of the most awesome challenges of this agreement facing the Coast Guard is antisubmarine warfare (ASW) in the MDZ. Very few Coast Guard platforms exist today which are equipped and trained for conducting ASW.

This paper will consider the Coast Guard's preparedness for its ASW mission in the MDZ in both peace and war time with current resources. It will also extrapolate trends to assess this capability in the future. This paper will not consider Maritime Defense Zone ASW in every conceivable conflict (i.e. nuclear, conventional war or low intensity conflict), threat environment, nor in the multitude of scenarios possible for

worldwide or even convoy ASW, but will deal with the strategic importan importance of coastal ASW within the MDZs and the Coast Guard's role in that effort.

A major challenge to safeguarding our National Security posture is coastal defense within 200NM of our coastline. The Coast Guard has this responsibility.

CHAPTER II
INTRODUCTION

A key question regarding preparedness for ASW for the United States Coast Guard (USCG) was summed up by a Royal Navy officer writing on the Battle of the Atlantic, who stated, "Two world wars have indeed taught us that a long period is required to build up antisubmarine forces, both surface and air; and by buildup is meant not only the provision of ships, aircraft and materiel, but the training of personnel to a high state of efficiency in the care, maintenance and operation of the technical equipment. Furthermore, if we are again to avoid running the grave risks as in 1916-1917 and 1940-1941, all must be in readiness for the attack on the submarine from the day war breaks out." (1)

I plan to identify the traditional Coast Guard missions and briefly review how the USCG executed its defense roles in past conflicts. I will also discuss how the Coast Guard is affected by the NavGard Board decision of 1984 in its traditional wartime only maritime defense mission. I will demonstrate how the Maritime Defense Zones fit into the National Security Strategy and then will identify the threats in these zones and the USCG's means, or forces, presently available to counter those threats. I will examine the options available for upgrading current Coast Guard antisubmarine warfare resources and project possible future directions for effective ASW in the Maritime Defense Zones.

CHAPTER III
BACKGROUND

Coast Guard Missions - The United States Coast Guard serves the nation in a host of maritime missions: Search and Rescue, Maritime Law Enforcement, Merchant Marine Safety, Aids to Navigation, Environmental Protection, Boating Safety, and Port Safety/Security. During wartime the Coast Guard becomes an extension of the Navy as prescribed in Title 14, United States Code, Section 3 (14 USC 3). The Coast Guard is thus a legitimate "armed service" responsible for maintaining a military preparedness posture at all times (see 14 USC 2), while continuing to perform its many and varied other missions. Coast Guard liaison officers are assigned in peacetime to the Joint Chiefs of Staff, Chief of Naval Operations, Secretary of the Navy, Secretary of Defense, and the Commanders-in-Chief of the Atlantic and Pacific Fleets, as well as with numerous other military and governmental organizations which will cooperate closely with the Coast Guard in wartime.

Coast Guard Defense Posture: A Brief History - Throughout the nation's history the Coast Guard has been intimately involved with protecting our coasts and merchant fleet. The following recap sets the stage for the Coast Guard to study and reevaluate its military missions, specifically ASW, within the MDZ.

The USCG Cutter *Northland's* capture of the German vessel *Buskoe*, near Greenland in September 1941 (the first maritime capture of World War II), frustrated Germany's attempt to set up weather stations in the Atlantic. In World War II, Coast Guardsmen operated whenever and wherever called upon

aboard USCG cutters, destroyers, frigates, corvettes, patrol craft, and in aircraft to escort convoys, patrol the coastlines and generally prosecute ASW on both oceans. (2:12-13) For example:

- The 165-foot USCG Cutter *Icarus* is credited with the first surrender of a German submarine in December 1941; and the 327-foot USCG Cutter *Campbell* sank one submarine by ramming it after a sharp gun battle in early 1943.

- "Later that same year, the USCG Cutter *Spencer* made an attack that involved the difficult feat of tracking a submarine through a convoy. This successful attack was conducted with such skill that the action report became part of the antisubmarine force doctrine." (2:12)

- "In World War II, in the critical convoy battles on the North Atlantic run of 1942 and 1943, all U-boats sunk by U.S. forces were sunk by Coast Guard cutters." (3:20)

- Coast Guard aviation is also credited with the sinking of a German U-boat southeast of New Orleans in August of 1942. (4:22)

These were notable successes, of course, but represented a tiny fraction of the overall Coast Guard ASW effort. Huge areas were heavily patrolled with relatively few actual detections and kills, underscoring the complex and frustrating task facing ASW forces today as the target has become far more elusive and deadly.

In Vietnam, twenty-six 82-foot patrol boat (WPB) cutters and five larger high endurance (WHEC) cutters patrolled the rivers and coastline, boarding "all suspicious-looking craft, searching for weapons, ammunition, and other contraband (while taking) part in hundreds of naval gunfire support missions and assisting ground forces with mortar fire." (2:14)

The Coast Guard was called upon to be the Nation's Maritime Policeman in the National "War on Drugs" in the 1980s.

In a cooperative approach, a multitude of interagency, and international, forces were brought to the "battle" on all fronts - the Caribbean, Gulf of Mexico, East and West Coasts. This effort has consumed many of the resources planned and committed to other tasks years earlier. Now the Coast Guard, stressed by this war on drugs, must find more manpower and equipment to develop the ASW capability necessary to defend our coasts and fulfill its role in support of the National Security Policy. We need to consider all of our options once again.

CHAPTER IV
NATIONAL SECURITY POLICY

ADM James D. Watkins, USN noted in the January 1986 U.S. Naval Institute Proceedings magazine that, "Our national strategy is built on three pillars: deterrence, forward defense, and alliance solidarity." (5:154) Then on 1 March 1988, the Honorable J. Lawrence Garrett III, in his testimony to the House Committee on Appropriations, stated that, "Maritime superiority for us is not a luxury but an immutable requirement, and sea power is the chief guarantor of our survival as a maritime nation. The ability of our naval forces to protect sea lanes and to serve as a visible forward deployed expression of U.S. determination to protect our vital interests is essential to the framework from which our national security is derived." (6:53)

The maritime component of National Military Strategy is composed of three general concepts: durability, flexibility and deterrence. (7) Each of these concepts plays a key role in determining force structure, but it is within the "flexibility concept" that the taxpayer gets the most "bang for the buck" in the Coast Guard, because of its multi-mission resources and overlapping qualified personnel.

"One mission area of vital importance, in which the challenge of the future is particularly pressing, is antisubmarine warfare. If we are going to enjoy the advantages of sea power in the 21st century, we must maintain our lead in this area. We must not relax our present strong commitment to the ASW challenge, and we must continue to make good decisions about the kind of ASW forces we want in the future." (8:48) Admittedly, when ADM Trost, Chief of Naval Operations, made

these statements he was referring to Navy resources, but because of the Coast Guard's recently assigned responsibility for defending the Maritime Defense Zones, these same standards for outfitting of the Coast Guard to prosecute this mission should not be ignored.

The Navy is primarily designed and responsible for force projection and employment away from U.S. shores. "In support of the National Security Objectives outlined by the President and Secretary of Defense in their annual reports, certain key objectives stand out as the rightful focus of future Navy and Marine Corps efforts:

- To deter war and, should deterrence fail, fight as far forward as possible to defeat armed aggression and to end the conflict on terms favorable to the United States, its Allies, and its interests and at the lowest possible level of hostilities.

- To foster robust alliances to preserve Western political identity and institutions, maintain international stability, and prevent hostile domination of vital areas.

- To maintain maritime superiority in the NATO area and in the Pacific Basin (including the Indian Ocean) and ensure that the continued economic growth of that region is protected.

- To ensure U.S. access to critical resources, markets, the oceans, and space." (6:54)

Dr. Colin S. Gray, a member of President Reagan's General Advisory Committee on Arms Control, put the National Security Policy in perspective by saying, "The United States is an insular superpower leading a maritime alliance, and that secure working control of trans-Atlantic and trans-Pacific sea lines of communication (SLOCs) is an absolute requirement if the United States is to contest the long-standing Soviet bid to break out of its landlocked condition in continental Eurasia." (9:177)

Virtually all of the Coast Guard's functions closely relate to national security planning and capabilities. Because of its small size and relatively low profile in the performance of its missions, the Coast Guard may have *appeared* at times in the past *not* to have been an integral part of the nation's defense network. In an effort to rectify that misperception the Coast Guard adopted the slogan "An Armed Service and More."

The Commandant of the Coast Guard, ADM Paul A. Yost, Jr., summarized it best, in the August 1988 Retired Officers Association National Security Report Newsletter, when he wrote that, "Since World War II, the threats to our nation's security have required the Navy to adopt a forward deployment strategy, facilitating the projection of battle groups and other naval forces into the Norwegian Sea and other far reaches of our shrinking globe. But this strategy left a void closer to our shores where mines, submarines, spetsnaz units, terrorism and industrial disaster threatened our sealift capacity." (10:1) With the establishment and assignment of the Maritime Defense Zones to the Coast Guard, there is little doubt as to how the Coast Guard fits into the overall National Security Policy picture. The new slogan, "The Guardians of the Sea," encompasses the full range of Coast Guard missions.

CHAPTER V

MARITIME DEFENSE ZONES

The Maritime Defense Zone commands "were established by a memorandum of agreement signed in 1984 by then-Secretary of Transportation Elizabeth Dole and then-Secretary of the Navy John Lehman." (11:107) They were created "to correct combat deficiencies in our National Military Strategy force structure along the coasts of the United States." (5:154) Because of the United States' worldwide commitments for alliances and agreements, the Navy has recognized the need to have the Coast Guard responsible for coastal defense out to 200 nautical miles from shore. As ADM Yost stated, "The establishment of maritime defense zones will help secure our sea lanes of communication and provide the Coast Guard with a clear focus for improving its military readiness through planning, exercising and training of reserve and active forces." (10:3)

The reasoning for using the Coast Guard for this coastal defense role came out of a joint high level Navy and Coast Guard study which "determined that the best course of action would be to establish a Maritime Defense Zone command organization that would take advantage of much of the existing infrastructure of Coast Guard districts and Naval base commands, with their associated Naval and Coast Guard active and reserve forces available for operations." (12:2) This appears to be a quick fix on the surface, but because of the great diversity in traditional mission areas, the Coast Guard and Navy must quickly reconcile who is responsible for what. Any questionable issues or areas of concern need to be ironed out now and set down in writing to avoid misunderstandings, as the command relationships within the MDZ commands are naturally complex.

The Maritime Defense Zones are Navy commands. They are headed by the Coast Guard Commanders who report directly to their respective U.S. Navy Commander-in-Chief, Atlantic and Pacific Fleets (see Command Structure Chart in Appendix), when activated for wartime operations and for planning and exercising purposes during normal peacetime. (13:24) While this may sound confusing, it permits the Coast Guard to develop the expertise, in peacetime, necessary to effectively operate in and with the Navy on a wartime footing. "MDZ responsibilities include contingency planning, exercising the plans with regular and reserve forces, and operational command of designated Navy and Coast Guard forces when mobilization occurs." (13:24)

Due to many factors, most notably that of budget restraints and presently limited Coast Guard defensive and offensive capabilities, it has been difficult to determine which missions the Coast Guard is actually going to perform in these MDZs. Those tasks identified so far include: port and coastal physical security & preventive safety, mine warfare & countermeasures, inshore undersea warfare, explosive ordnance disposal, surveillance & interdiction, search & rescue, harbor clearance & salvage support, offshore asset protection, antisubmarine and antisurface warfare. All missions will be reviewed and appropriately assigned to the agency, department, or branch which is deemed most capable of performing them.

The general mission guidelines which Commander-in-Chief, Atlantic Fleet (CINCLANTFLT) has issued to MDZ Atlantic are: "Plan for and, when directed, conduct, coordinate, and control operations in the area designated as the Maritime Defense Zone Atlantic, as required, in order to ensure the integrated defense of the area, to protect coastal sea lines of communications, and to establish and maintain necessary control of vital coastal sea areas, including ports, harbors, navigable waters, and offshore assets of the United States." (13:24)

There is a great diversity in the environment and oceanography affecting ASW in the Atlantic and Pacific Oceans, the Gulf of Mexico, and the Caribbean Sea. The respective area commanders, and specifically each sector commander, will need to tailor their force capabilities to ensure the appropriate platforms are assigned the proper tasks. More specifically, because of the extreme environmental variability in his area, Commander, Maritime Defense Zone Atlantic has significant problems to solve.

CHAPTER VI
THREATS

What are the threats which the Coast Guard has to combat in the MDZs? The Coast Guard sees them as ranging across the full spectrum of its responsibilities. They include: mining, submarine warfare, civil disturbances, terrorism, intelligence collection and special operations. (12:5) All threats are contingent on how the United States and its enemy would initiate, then fight a war. The basic threat premises were articulated by Captain Liebmann, USN, Chief, Plans and Exercise Division, Coast Guard ComLantArea, at the Master Mariners Course presented at the U.S. Merchant Marine Academy in December 1988. They are that: (1) a conventional sea war is a credible possibility; (2) the Atlantic and Pacific "sea bridges" will be as vital as in past wars; (3) the enemy knows this and will have sufficient incentive to try to close them; (4) the threat exists right up to U.S. shores; (5) defensive operations will probably include convoying; and (6) the situation is not hopeless, if coordinated efforts are employed now and are in place when a war begins. We are already "a lot smarter and a lot better organized than we were in 1942." (12:33)

The Soviet Union as a Threat - Most scenarios center around the European battlefield and the necessity for U.S. support across the Atlantic. Why would the Soviets even bother to come to the United States, when their transit time would be greatly reduced by fighting off the European coast, in the Mediterranean or North Norwegian Seas? They would probably position submarines close to U.S. coastlines if they could expect to be

more successful in the "low-threat, target-rich" environment in the MDZs when compared to the greater risk their submarines would encounter when operating near the European coasts. Many factors lead one to see the MDZs in this light, the two major ones being: the numerous inherent environmental problems involved in detecting submarines and prosecuting "shallow water ASW" and the reduced ability of the Navy to defend the U.S. coast while projecting its power elsewhere.

To elaborate: antisubmarine warfare has changed significantly since World War II - the visual search for and location of a submarine, caught on the surface, once almost the sole means of ASW, has been eclipsed by nuclear submarines who rarely operate on or near the oceans' surfaces. Finding these "nukes" requires an exotic array of modern acoustic and non-acoustic sensors mounted or various platforms, all operating in concert in a combined arms approach to ASW. The U.S. Navy has been developing their capability for open ocean ASW by improving coordination and integration of ASW forces for years and has invested billions of dollars doing so. The U.S. Coast Guard, with fewer resources, faces a tremendous challenge, for acoustic conditions tend to be less favorable for ASW in the MDZ than in the open ocean. Maritime Defense Zone ASW demands more assets and greater integration of air, surface and subsurface platforms than open ocean ASW. Since the USCG is very small compared to the US Navy, facing this challenge squarely demands an appropriate buildup of Coast Guard capability as a first priority.

Soviet naval priorities have recently, in the last five years, been rearranged to move interdiction of SLOCs from last to number four, as seen in the below listing of Soviet Naval Priorities:

1. Ballistic Missile Submarine (SSBN) Strategic Offensive
2. a. Homeland Defense against U.S. Strategic Airpower
   b. Homeland Defense against U.S. Aircraft Carrier Battle Groups
3. Worldwide Maritime Logistics Support of Land Forces
4. Interdict Sea Lanes of Communication (SLOC)
5. World Presence ("Wave the Flag")
6. Worldwide Force Projection (7)

Recognizing the above change in priorities, there is bound to be an additional debate in the Soviet Navy over the merits of which is the most desirable and cost effective submarine attack area of operation: mid-ocean or coastal (i.e., at the SLOC choke points). This discussion would revolve around two items: (1) the universal submariner's concern over becoming a "hot datum" once he has fired a weapon and given away his position, and (2) which is more important - more targets at choke points or more room to maneuver in the open ocean?

As of 1987, the Soviet Defense Council's submarine force objectives contained two key elements relevant to the Maritime Defense Zones:

a. "To project power and deploy submarine weapon systems in ways that will stretch Western antisubmarine resources to the limit or beyond in times of tension or crisis, thereby preventing the West from assembling a sufficiently concentrated offensive force to invade the Soviet Union.

b. To maintain the ability of disrupting trans-Atlantic supply lines and preventing the safe and timely arrival of convoys." (14:274)

"In his first statement to the Congress, in February 1987, (the Chief of Naval Operations, ADM Trost) singled out three challenges requiring special congressional consideration: ship manning, antisubmarine warfare, and shore facilities. With respect to ASW, ADM Trost stated: 'The Soviet Union has placed

increased emphasis on closing the gap in undersea warfare through an aggressive and effective submarine quieting program and an intensive ASW research effort. Without increased emphasis on a variety of advanced ASW research programs ... the United States could lose the technological advantages in this area crucial to the maintenance of maritime superiority and support for national military strategy.' Coupled with this Soviet aggressiveness in submarine/antisubmarine warfare is the historic Soviet emphasis on numbers of submarines. Today, the Soviet navy has approximately three times the number of U.S. undersea craft, with several new classes being at sea in prototype form or actually in production." (15:50) "The Soviet Navy continues to build a substantial attack submarine force. There are at present three different classes of SSNs ('Akula', 'Sierra', 'Victor III') under construction, as well as the 'Oscar II' SSGN." (16:1233) And as the Honorable H. Lawrence Garrett III stated, "The Soviet submarine fleet is now 55 percent larger than the combined submarine fleets of the Western alliances." (6:55)

Is the Soviet submarine threat likely to U.S. ports and harbors? Consider the recent emphasis by the Soviets in building their navy worthy of a maritime power projection philosophy vice homeland defense only. Where is the Soviet Navy headed? While American intelligence specialists are uncertain about the true significance of Soviet Rear Admiral Nikolay V'yunenko's book, "The Navy: Its Role, Prospects for Development and Employment", there is little doubt that unlike the U.S. Navy, which is designed around the aircraft carrier, the Soviet Navy sees the submarine as king. (17:12) They believe that "all of the principal indicators that characterize any modern navy are concentrated in the nuclear-powered submarine: great striking power, high mobility and concealment, the capacity to conduct combat actions on a global scale - destroying enemy ground targets, submarines and surface combatants." (17:12) V'yunenko's projects are directed towards: faster, deeper diving

subs; undersea transports; aircraft-carrying subs; and small, high-speed, special-purpose sabotage/spying subs. (17:12) The United States needs to be able to counter these future Soviet threats.

Additional threats - Many other nations of the world operate submarines. Admittedly they are not all of the Soviet nuclear attack (SSN), ballistic missile (SSBN), and guided missile (SSGN) submarine quality, but they do in fact pose a threat, should those countries decide to use them against the United States.

What types of threats will our forces face? The submarines "are capable of mine, torpedo and missile attack ... (while) a secondary threat consists of hostile surface craft, likely posing as fishing vessels, merchant ships, or other noncombatant craft, engaged in covert operations including mining, terrorist acts, suicide missions, insertion of special forces, etc." (18:1) These threats will be directed at shipping, coastal defense, ports, harbors, and arriving and departing civil and military aircraft at coastal airports. The threats are real and need to be defended against. All naval strategy is designed around the ultimate goal of maritime superiority. If the Coast Guard is able to plug the "gap" in our national defense and prevent a war or local attack, then our Deterrent Strategy will have been worth the cost.

CHAPTER VII
THE MEANS

A Royal Navy officer once stated, "The aim of antisubmarine warfare is to deny to the enemy the effective use of his submarines. This can be done both by destroying those submarines, and by adopting dispositions, movements, and tactics that inhibit them." (19:38)

It is possible, and most probable, that the Coast Guard will become involved in convoy escort of some sort or individual transocean "sling-shotting" of the high speed merchant ships in the U.S. Transportation Command. The later concept entails equipping those few transports with sensor and weapons delivery systems, as well as with ASW capable helicopter detachments. The ports and choke points of the major sea lines of communication on the Atlantic and Pacific coasts, including Alaska, as well as in the Caribbean Sea, Gulf of Mexico and Hawaiian Islands are of immediate concern for Coast Guard ASW resources.

Retired Coast Guard Rear Admiral Sydney A. Wallace identified the objective of the MDZs, consistent with U.S. maritime strategy, as ensuring that: "(1) SSBNs successfully sortie in accordance with contingency plans; (2) battle groups, amphibious groups, submarines, and support ships deploy unimpeded from U.S. ports when hostilities are imminent; (3) reinforcement and resupply shipping, in support of forward deployments, departs U.S. ports and coastal areas safely; and (4) safe and secure water transport of economic cargos continues from U.S. ports and coastal areas." (13:24)

It takes a multitude of platforms, sensors and weapons systems to prosecute antisubmarine warfare. "Team Hunting," as Captain Mueller articulated in his October 1987 article in U.S. Naval Proceedings Magazine, "synergistically welds our three most effective ASW platforms," (20:125) and greatly reduces the chances of an enemy getting away. The stages of the antisubmarine warfare process are: Detection, Classification, Localization, Tracking and the Kill. (19:44-52) "In all cases it is best for ASW forces to find and destroy a submarine before it shoots - or, by maneuvering and harassment, try to prevent it from firing." (14:155) If the ASW forces are able to "oblige submariners to keep their heads down" (14:158) and not become that "hot datum," then deterrence, once again, will be the key to success. "The more ASW systems and devices there are at sea, the more difficult it is for a submarine commanding officer to take them into account; and anything that confuses or deceives him - from course and speed variations (zigzags) through camouflage and electronic surveillance measures (ESM) to any way of exploding charges in his vicinity - is a worthwhile addition to the ASW bag of tricks." (14:160)

Platforms - The three types of ASW platforms are surface ships, aircraft, and submarines.

a. Surface ships are perhaps the best communications platforms available, unfortunately however, they are also the most vulnerable to submarine attack. They can carry and deploy diverse packages of sensor and weapons delivery systems.

b. Aircraft fall into two basic categories - fixed and rotary wing. Both can be operated from land bases and ships, depending upon type of each. The benefits to be derived from aircraft constitute large search areas, speed of movement, flexibility and versatility. They are dependent on weather, basing radius and have greatly varying endurance capabilities.

c. Submarines encompass many of the attributes most desirable in an ASW platform. They have extreme endurance, outstanding seaworthiness, creature comforts, and stealthiness. Submarines are also considered to be the most effective ASW platform available for searching, trailing and delivering of weapons, primarily because they are actually in the medium with the target. If they have a weakness it would have to be communications, but with modern technology constantly improving, this gap with the surface ships is closing rapidly. While not as maneuverable as aircraft, they have a higher probability of kill once the ASW process has begun. (21:60)

Sensors - An assortment of actual and potential sensors are available, which basically break down into two categories: acoustic and non-acoustic.

a. Acoustic sensors include sonar, dipping sonar, hydrophones, sonobuoys, Towed Array, and Active Towed Arrays. The Soviet submariner is extremely conscious of the extensive fixed sound surveillance system (SOSUS) warning chains, the rapidly deployable air-laid sonar systems (RDSS), and the surface towed array sonar system (SURTASS) available to U.S. forces. "Warning installations, which are not confined to the Eastern Atlantic, do, without question, give U.S. and NATO commands a constant and remarkably clear idea of Soviet movements." (14:159)

b. Non-acoustic sensors include: optical sonars; air and space based photography, such as synthetic aperture radar (SAR) and side-looking radar (SLAR); thermal imagery, as in the forward looking infrared (FLIR); magnetic anomaly detectors (MAD); low-light television (LLTV); and laser imagery. (21:85-88)

Weapons - There are a host of weapons systems available which fall into the general categories of air, surface and submarine launched torpedoes (with conventional and nuclear warheads) and mines of many types.

Integration - As stated earlier, it takes an integration of all of these platforms, sensors, and weapons systems to effectively work through the five stages of the ASW process. The weaknesses of each platform, sensor and weapons system is argument enough for not operating them independently. With respect to platforms, "used as an ASW team, the surface ship, maritime patrol aircraft, and submarine can offset each other's vulnerabilities. The basis of the combined-arms concept is to combine the strengths of each platform (sensor, and weapons system) to negate their individual weaknesses and kill enemy submarines as efficiently as possible, with minimal risk." (20:122) The bottom line in sensors is measured in that "the value of the information may depend on whether an ASW attack platform can reach the area before the submarine gets away." (21:82) A "multiplier effect" is obtained when all elements of the ASW team - platforms, sensors and weapons - are applied to the effort.

Present National Antisubmarine Warfare Capabilities

NAVY - The United States Navy's antisubmarine warfare capabilities are regarded by the Soviets as the "best" in the world. Our combined surface, air, space and subsurface forces represent a major threat to Soviet submarine operations. They, in fact, consider U.S. "pounce capability" awesome! The Navy's ASW Command, Control and Communication (C^3) system seems to be the key to this accolade from the Soviets. "A former U.S. Secretary of the Navy, Graham Claytor, has pointed out 'our

ability to orchestrate the many components in an effective antisubmarine hunter-killer force has enormously improved in recent years'. The improvement seems to correlate with increased use of satellites for high speed communications and data transfer between ASW forces and processing facilities both at sea and ashore." (21:137)

COAST GUARD - A joint Navy-Coast Guard working group, tasked by the NavGard Board in May 1988, studied the Coast Guard's ability to perform ASW with its current compliment of aircraft and ships. (22:2) They found that, with only one exception, present United States Coast Guard antisubmarine warfare prosecution capability is limited to visual and radar surface search. Possible Coast Guard ASW resources are identified below.

- The only true Coast Guard ASW platforms are embodied in the *Hamilton* Class 378-foot High Endurance Cutters (WHEC), 12 in total. Following the fleet renovation and modification (FRAM) program, they will be outfitted with an upgraded acoustics processor for its hull-mounted sonar, surface vessel torpedo tubes, chaff, Nixie, sonobuoys, Harpoon and Phalanx launchers and the LAMPS I ship/helo electronics suite, even though Coast Guard helos are not LAMPS I or III equipped. (23:33 & 24:100) Incidentally, these modern, high-speed cutters are regarded by most U.S. submariners as an extremely difficult class of surface ship to evade, once they have been localized.

- The 31 USCG HC-130 *Hercules* transport aircraft could conceivably (but at great expense) be outfitted with modularized ASW search and weapons delivery packages, but will most likely become U.S. Transportation Command cargo and troop carriers, while continuing to prosecute present logistics missions for the Coast Guard. The HC-130 is, perhaps, the best visual search platform in the Coast Guard inventory with

exceptional endurance and on-scene loiter capability.

- The Coast Guard's 2 E-2C *Hawkeye* airborne early-warning search aircraft are excellent platforms for air surveillance and have been extremely beneficial in the "war on drugs" air interdiction effort in the Caribbean and Gulf of Mexico. How they would participate in MDZ ASW depends on many factors which would have to be determined at the time of tasking.

- Of the remaining possible ASW platforms, the 13 *Bear* Class 270-foot Medium Endurance Cutters (WMEC), the 36 HH-3F *Pelican* helicopters and the 41 HU-25A/F/C *Guardian* Falcon Jets appear most adaptable to the ASW mission, and do in fact possess radars (though primarily weather avoidance and unusable for detecting periscopes) and other electronics tracking equipment (i.e., the infrared and air-intercept modified HU-25B & C models) worthy of air and surface searches for submarines. Admittedly, the 16 *Reliance* Class 210-foot WMECs and 77 HH-65A *Dauphin* helicopters could be modified for ASW work, but due to many other considerations (i.e., weight, moment and space limitations) it is most unlikely that they will be used for anything more than for their present visual and limited radar search capabilities. (24:101) None of these aircraft, however, are presently equipped with suitable secure communications, sensors or weapons delivery systems to adequately perform the ASW mission. (18:1)

- "Currently, the Coast Guard operates four classes of patrol boats that range in size from 82 feet to 110 feet," all of which could be used in an ASW weapons delivery mode. The new *Island* Class of 110-foot Patrol Boat (WPB) was designed with "a ten-ton space and weight reservation for additional weapon systems." (24:102)

- The Coast Guard also runs more than 2000 other surface craft under 65 feet in length which could be used close-to-shore and in ports, harbors and waterways.

RADM Wallace also noted that the Coast Guard's drug-interdiction operations constitute ideal training for MDZ duties. "Operations are fast-paced and continuous; command, control, communications, and intelligence (C^3I) functions are exercised in demanding conditions, where the unexpected is the norm and tight security is the standard. Multiunit, multiagency task-force operations are planned, conducted, and analyzed on a regular and frequent basis. The enemy is real, dangerous, and anxious to elude detection and apprehension. Certainly drug interdiction, properly conducted, requires the application of military principles, skills, and hardware in real time and conditions, and its training value in preparing for hostilities is immense." (13:27) As a result of its intense drug-interdiction operations, the Coast Guard has identified some C^3I deficiencies, with the Chief of Naval Operations issuing an Operational Requirement (OR) to upgrade all Maritime Defense Zone secure tactical communications systems as funds become available. (25)

If the Coast Guard is expected to execute ASW effectively in the MDZ, many important questions will need to be answered. This paper has not attempted to address every potential question, but I do believe a study needs to be conducted to work through the problems. For example, one important area not addressed at all by this paper is the role of the Coast Guard Reserves, properly equipped and trained, in augmenting regular forces for MDZ antisubmarine warfare.

CHAPTER VIII
ANALYSIS

With the inception of the Maritime Defense Zones, Coast Guard missions now include accountability for coordinating the defense of United States coastlines, coastal SLOCs, ports and harbors. Coast Guard resources are located in ideal positions to accomplish this tasking, but its ASW capability must be developed in peacetime to ensure wartime preparations are completed. Recognizing the extremely long lead time required to outfit and train for ASW, should a war break out in which the United States' coasts are threatened there will not be time for the Coast Guard to "gear-up" as it did in World War II. The equipment needs to be on hand, the personnel trained and proficient in its use for effective employment when needed - time will be critical!

The Navy's forward power projection strategy, and the expected WHEC and HC-130 war-tasking explained above, will effectively leave the Coast Guard with only visual and limited radar surface search capability in its aircraft, cutters and boats. For the United States Coast Guard to legitimately address the coastal (MDZ) antisubmarine mission, it will need to have a broad array of platforms, sensors and weapons systems operating synergistically, as the Navy does. A strategic approach, or long range plan, needs to be developed and implemented. Such a plan will compensate and eventually correct this shortfall in effective ASW platforms.

The Planning Phase - This is the most important and comprehensive phase, if any ASW assets are to be assigned to or purchased for the Coast Guard. The Coast Guard must get together with the Navy, as is being done now with the NavGard Board, to determine which of the below options it wants to propose to Congress. Congress must determine what it wants the Coast Guard to pursue in the ASW arena. Until a decision is made, the Coast Guard will use its equipment and capability in the most effective manner possible to prosecute the ASW mission. As long as there is an ASW mission for the Coast Guard, detailed planning to improve its force structure and capability will be an intrinsic part of the challenge.

The Military Readiness mission and the Maritime Defense Zone have received increased emphasis and visibility, but further enhancement will be necessary. A review and determination of all Coast Guard mission priorities will have to be made. All pre-planning for any option will actually be a continuous, ongoing process with constant updating of information, priorities, and actual scope of ASW coverage. Force structure and strength, i.e., equipment, personnel, and base locations, will have to be identified. It is also important for the Coast Guard to "get on-board" with all ASW research, development, test and evaluation (RDT&E) efforts.

What options does the Coast Guard have in this important national security issue? Should the Coast Guard even pursue an ASW mission? If so, should it only maintain its present capability, upgrade with "hand-me-down" or current Navy systems, or develop a long range plan to acquire future technology equipment? Does the Coast Guard command structure need to be reviewed, and if so, does the organizational structure need to be modified when missions change, re-prioritizations occur and new equipment is purchased?

The Implementation Phase - Taking into account the previously discussed wartime reassignment of the *Hamilton* class cutters to the Navy and the HC-130s to the Transportation Command, I see the following options for integration of the Coast Guard into the world of ASW:

1. "No Upgrade" Option - This option maintains current resources at the level they presently hold, which means that no improvements will be made beyond the current systems installed and in use. These surveillance capabilities only include visual and limited radar search, along with a minimum number of weapons delivery platforms, which were identified previously. Unfortunately, this option will remain an ineffective and inefficient form of ASW, pose no deterrence to an enemy, and is precisely the reason for the Navy establishing the MDZs and assigning them to the Coast Guard to find solutions. I do not see this as a viable option.

2. "Minimum Upgrade" Option - The commencement of this option will be determined when the decision is made, in the planning phase, to pursue a buildup of Coast Guard ASW forces. This option involves obtaining roll on/off modularized equipment, i.e., surveillance and weapons delivery systems, suitable for Coast Guard platforms.

Some possible non-acoustic sensors could include low-level television and infrared (LLTV/IR) and magnetic anomaly detection devices (MAD), along with acoustic sensors such as sonobuoys and its processing equipment. (18:2) Specific platforms will have to be identified once the modularized equipment and ship/aircraft limitations are evaluated and matched. A possible source for this needed equipment will be the U.S. Navy. As advanced ASW equipment comes into the fleet, the Coast Guard could obtain the older Navy gear, i.e., the LAMPS I ship/helo system, P-3 *Orion* land-based and S-3 *Viking* carrier-based ASW aircraft.

Regardless of the equipment obtained, the Coast Guard needs to (1) have secure (UHF & HF) voice radio, or data link and (2) become a part of the submarine intelligence network - a necessity for any serious ASW in the MDZ. Having these two capabilities will prevent confusion and the possibility of "blue-on-blue" confrontations.

Because Coast Guard personnel are, in general, presently unfamiliar with ASW equipment a comprehensive training program would have to be initiated. Also, because of the technology involved, it may be best to initially leave the maintenance to be performed by Navy technicians. A key factor to keep in mind during this phase is - don't try to reinvent the wheel, use on-the-shelf Navy equipment, training & maintenance facilities for the quickest employment of these newly acquired Coast Guard resources.

Assuming adequate funding and readily available equipment, these additions would increase the Coast Guard's capability to prosecute ASW. Unfortunately, this option is only a stopgap measure, and accomplishing this minimum amount of upgrade ensures only a semi-effective deterrence.

3. "Full Upgrade" Option - This is the most aggressive option, in that it ignores the "minimum upgrade" option. It entails equipping the Coast Guard with state-of-the-art Navy ASW systems now and continuing with all future improvements. This option could develop a formidable deterrent force for the United States in a relatively short period of time, but at a cost which may be beyond financial possibilities. This is the "major" modification, purchase and training option with some force packaging recommendations identified below.

The 270-foot *Bear* Class cutters were designed to receive the fully integrated SQQ-89 Sonar System, which comprises the LAMPS-III ship/helo package, SQR-19 Tactical Towed Array Sonar (TACTAS), SIMAS and SQS-56 Sonar. (26) They could also be outfitted with Harpoon, Phalanx (23:33) and torpedoes.

The 210-foot *Reliance* Class cutters could be modified, using the Navy's *Arleigh Burke* (DDG-51) class guided-missile destroyer as an example, by having a LAMPS system installed with no helos assigned. (27:95) They could also receive minimal weapons delivery capability, (26) and as was previously noted, the 110-foot *Island* Class was designed for and can be modified to handle ten-tons of additional weapons system. (24:102)

Some of the newly acquired HH-60Js, with secure communications capability, could accept the LLTV/IR package, the LAMPS I system and be modified to carry ASW weapons. Sometimes it is extremely difficult to "back fit" technology and I recognize that, "although the HH-60J is a derivative of the Navy's Combat SAR helicopter, the two aircraft are not interchangeable and cannot do the same mission." (22) Therefore, several LAMPS III SH-60Bs will have to be purchased for independent Coast Guard operation with the *Bear* Class Cutters. Helo "self protection" packages, comprising the ALQ-144 infrared jammer and ALE-39 chaff/flare dispenser, should be installed. The HU-25As, with secure communications, could also be modified with weapons delivery systems.

Because of cost considerations, I do not believe it beneficial to modify the 95 and 82-foot patrol boats (WPBs), HH-65s and HC-130s beyond any possible roll-on/off modularized ASW systems which may be available, although both the HH-65A and HC-130 could be converted with existing modifications.

To reiterate, this option would provide significantly enhanced, "real-time" Coast Guard antisubmarine warfare capability, but would take longer than the "minimum upgrade" option to implement.

4. "New Purchase" Option - This "Future Technology" option, in which research, development, test and evaluation is going to fulfill the needs of the services, assumes the acceptance of present visual search capability until "appropriate for the Coast Guard" equipment becomes available

and economically feasible.

Because of technological advances, it is almost impossible to speculate on which ASW systems will be developed in the future. But, if the Coast Guard is going to wait for new platforms to be purchased before upgrading its ASW forces, it needs to be included in the Navy's RDT&E antisubmarine warfare programs and acquisition processes as soon as possible. This will ensure compatibility with the Navy in all aspects.

Fortunately, future ASW systems, with their integrated C^3I, automated surveillance and data-link capability, will have extremely beneficial uses in all of the Coast Guard's other missions. The Coast Guard's peacetime missions will be the recipient of the latest technologies available and personnel will be proficient in using them for war.

In this option new platforms will be purchased, surface and air, which must perform all of the Coast Guard missions, including ASW. Speculation on the ASW platforms must include the V-22 tiltrotor *Osprey*, airships, balloons, unmanned aerial vehicles (UAV), the next generation maritime patrol long-range air antisubmarine warfare capable aircraft (LRAACA), surface effect ships (SES), multi-hulled ships (SWATH), and remotely piloted vehicles (RPV).

Presently, there is considerable talk in the Navy about "integrated" ASW commands. (20) The Coast Guard could be a leader in developing and applying the concept of a Standing ASW Squadron (STASRON). In this concept all platform types - fixed & rotary wing aircraft, ships, and submarines (mini-subs) - combine to form an integrated ASW force. (28:120) If it is determined that the Coast Guard should enter into the subsurface world, mini-subs and submersible RPVs could be explored. Mini-subs, like regular submarines, have many advantages in the ASW arena, as was explained earlier. They could be towed to a search area, if unable to get there under their own power, then be released or launched to become an extremely important part of an integrated ASW team. (14)

Bypassing either of the above upgrade options and delaying, until an economically feasible time has arrived to outfit the Coast Guard for ASW, is a most difficult and potentially dangerous decision which could leave the U.S. coasts, ports and harbors virtually defenseless to submarine threats.

5. "Combined" Options - Determining which of the above options to pursue is a difficult decision. It may be necessary to choose more than one and even sequentially work through them in a long-term, well developed plan. Costs are an obvious major factor. The expense of a gradual upgrade in the Coast Guard's ASW capabilities in the MDZ will reap the benefit of improved National Defense and deterrence.

Some combinations, of the above four options, include the following phased plans:

(a) Progressing through all four options.

(b) Omitting the "minimum upgrade" option.

(c) Omitting the "full upgrade" option.

(d) Progressing to a "mid-level" option (previously undefined), which might include parts of both the upgrade options; thereby, always keeping the Coast Guard below "state-of-the-art" Navy technology.

Any combination of options is an improvement over present Coast Guard ASW forces. I personally feel that the full implementation of all four options, i.e., "combined" option (a), is the best course of action for the Coast Guard to take. It will provide the nation a formidable coastal ASW defense force in a phased plan, with a reasonable timetable, and with recognizable costs directly associated with an end product.

Review - This is a most difficult period of adjustment for the Coast Guard. Commander Fraser, in his article "So Long, Mr. Nice Guy," identified the following five changes facing the Coast Guard:

1. closer ties with the Navy,

2. appropriate hardware and technology needs,

3. wartime budget effectiveness must be obtained,

4. increased emphasis on peacetime duties that have military applications, and,

5. a new, rejuvenated service culture, inclined toward the transition from peacetime to wartime missions, must prevail. (29:38-42)

As would be expected with any of the above phased plans, option overlap will be experienced and is caused by the implementation process of getting a new system on-line while still operating the "old" system. This will cause competition for the limited dollars available. But any new system, to be effective from the first day of operation until it is phased out, must be uncompromisingly supported. Tough decisions and changes will have to be made throughout to ensure there is no waste. Disregarding the "no upgrade" option and regardless of which other option, or combination, is chosen, the Coast Guard needs to negotiate with the Navy, now, to place personnel in the Navy ASW systems procurement programs to ensure any Coast Guard requirements or concerns are evaluated.

Each of the above challenges can, and will, be dealt with. Already we have seen a change in the mindset of Coast Guard men and women, as demonstrated in how well they have adapted to the "maritime policeman" role while still maintaining the "rescuer" enthusiasm and image. If, and when, properly outfitted and motivated, it will be an easy transition to the "warrior" mentality. Historically, the Coast Guard has responded to the call, so there can be little doubt that it will rise to any future challenge if properly prepared. Obviously a plan for evaluating the situation and determining the road ahead is called for.

A most important element for survival of any program is substantive backing from the many interest groups involved. Each group, whether it is the Congress, the Department of Defense (specifically the Navy), public defense minded groups (such as the Navy League, Veterans of Foreign Wars, etc.), or even all those personnel working in or with the Coast Guard must be educated on the importance of the new ASW mission in national security, and its priority within the Coast Guard's multitude of other taskings. Funding and budget authorization for follow-on phases will have to be developed and obtained. Critical to the budget process, the timing for commencing and ending any phased program will be determined during this initial planning process, but it may be revised as the program continues.

The Coast Guard needs the Navy to provide training for its equipment operators, pilots and maintenance personnel. Recognizing this tremendous additional burden, trained and experienced (when they become available) Coast Guard personnel should be assigned as additional instructors to supplement the Navy/civilian staffs.

With any of the above options, excluding "no upgrade", the Coast Guard will be able to effectively prosecute the ASW mission in the Maritime Defense Zone; and by acquiring equipment through "add-ons" to U.S. Navy contracts, costs can be kept at a minimum while maintaining commonality within the ASW community.

CHAPTER IX
CONCLUSION

All of the Coast Guard's missions are important and necessary to the nation. But, I agree with Commander Jamison's, USCG, Special Assistant to the Commandant, statement, "I cannot envision a Coast Guard without major life-safety missions such as we have today. It is not in the will of the U.S. people to abandon these serious responsibilities. And there is no other organization as well suited as the Coast Guard - organizationally or professionally - to carry them out. The improvements we have made recently in military readiness and drug law enforcement have been timely and important, but we would no longer be a Coast Guard without the responsibilities we have in our equally critical safety-of-life missions." (30:24)

LT Leblanc, USCG, reaffirmed the Coast Guard's legitimacy as a national defense role player, in his comments in the December 1988 U.S. Naval Proceedings, by stating that, "It is fulfilling that role in several ways, particularly through the U.S. Navy's Maritime Defense Zone Command. But the Coast Guard should concentrate its national defense effort on threats immediate to the U.S. coastline - submarines and mines. Given the U.S. Navy's maritime strategy and its forward deployment concept, in a full-fledged conventional war the Navy will take its resources and go - leaving the Coast Guard to mind the store." (31:19)

As the name implies the Coast Guard's mission is to "guard the coast," and without the proper equipment this becomes an impossible task.

Like all successful organizations, the United States Coast Guard must continue to move forward and evolve with technology. Statements such as, "We can continue to do more with less,"

"When the time comes we'll be able to do it, somehow," only serve to widen the disparity between Coast Guard capability and reality in the ASW world.

To reiterate, the Navy's ASW mission requirements of forward power projection will preclude the use of a major portion of its resources for coastal United States patrols. As a result, the Coast Guard has been given this responsibility and should be properly funded and equipped in peacetime to be fully prepared for war.

What can be done to rectify the current situation of inadequate resources for proper mission employment? Admittedly, "ASW is an unavoidably expensive game." (14:175) During the present reduced and constrained fiscal environment - which is expected to continue for many years to come - the Department of Transportation is going to have to share, with the Department of Defense, the expense of outfitting the Coast Guard for its ASW mission. Because the Navy has shown proper justification, many believe that "funding for ASW is not likely to be cut significantly in the next 10 years." (32:74) This will be a politically uphill battle for money, as well as a change in emphasis (at least in certain coastal areas) of current Coast Guard missions.

I am not recommending the Coast Guard become the U.S. Navy in miniature. It is an adjunct in its defense roles and distinctly separate in its other missions. There have been divergent views and missions in the past about what the Coast Guard was to accomplish. Any progressive and living organization will have debate. That is healthy. But extended debate, which stifles progress, will destroy an organization. The Coast Guard can no longer ignore ASW. It is a warfare mission common to the Navy in which the Coast Guard must have compatible equipment and procedures to effectively integrate into the overall defense picture.

A fundamental shift in the Coast Guard's approach to developing force structure is necessary to stay in line with its

newly assigned defense mission. Let's get on with this planning process to select a direction, make a decision and develop a phased plan for implementing Coast Guard antisubmarine warfare in the Maritime Defense Zones.

I close by leaving you to soberly reflect on Francis Bacon's words,

> "He that will not apply new remedies
> must expect new evils;
> for time is the greatest innovator." (1)

APPENDIX

MARITIME DEFENSE ZONE
COMMAND STRUCTURE CHART

Fleet Command and Service Commander

CINCPACFLT Navy, Admiral	CINCLANTFLT Navy, Admiral

Maritime Defense Zone Commands and Locations

MarDeZPac Coast Guard, Vice Admiral San Francisco, Ca.	MarDeZLant Coast Guard, Vice Admiral New York, N.Y.

Sector Command Location and Service Commander

Adak Is., Ak. - Navy	Boston, Ma. - Coast Guard
Juneau, Ak. - Coast Guard	St. Louis, Mo. - Coast Guard
Seattle, Wa. - Coast Guard	Roosevelt Roads, P.R. - Navy
San Francisco, Ca. - Navy	Norfolk, Va. - Navy
Long Beach, Ca. - Coast Guard	Charleston, S.C. - Navy
San Diego, Ca. - Navy	Miami, Fl. - Coast Guard
Honolulu, Hi. - Coast Guard	New Orleans, La. - Coast Guard
	Cleveland, Oh. - Coast Guard

GLOSSARY

ASW	Antisubmarine Warfare
ATAS	Active Towed Array Sonar
CINCLANTFLT	Commander-in-Chief, Atlantic Fleet
C^3	Command, Control & Communications
C^3I	Command, Control, Communications & Intelligence
ESM	Electronic Surveillance Measures
FLIR	Forward Looking Infrared
FRAM	Fleet Renovation and Modernization
LAMPS	Light Airborne Multi-Purpose System
LLTV/IR	Low-Light Television/Infrared
LRAACA	Long-Range Air ASW Capable Aircraft
MAD	Magnetic Anomaly Detectors
MarDeZLant	Maritime Defense Zone, Atlantic
MarDeZPac	Maritime Defense Zone, Pacific
MDZ	Maritime Defense Zone
MPA	Maritime Patrol Aircraft
NavGard Board	Navy-Coast Guard Board
OR	Operational Requirement
RDSS	Rapidly Deployable air-laid Sonar System
RDT&E	Research, Development, Test & Evaluation
RPV	Remotely Piloted Vehicle
SAR	Search and Rescue or Synthetic Aperture Radar
SES	Surface Effect Ship
SLAR	Side-Looking Radar
SLOC	Sea Lanes of Communication
SOSUS	Sound Surveillance System, United States
SSBN	Ballistic Missile Submarine, Nuclear
SSGN	Guided Missile Submarine, Nuclear
SSN	Attack Submarine, Nuclear
STASRON	Standing Antisubmarine Warfare Squadron
SURTASS	Surface Towed Array Sonar System
SWATH	Small Waterplane Area Twin-Hull Ship
TACTAS	Tactical Towed Array Sonar System
TOR	Tentative Operational Requirement
UAV	Unmanned Aerial Vehicle
USCG	United States Coast Guard
WHEC	Coast Guard High Endurance Cutter
WMEC	Coast Guard Medium Endurance Cutter
WPB	Coast Guard Patrol Boat

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